

# Chp 4 Gallery of Graphs

## 4A Rectangular hyperbola

Parent Graph

$$y = \frac{1}{x}$$

Asymptotes

$$x=0$$

$$y=0$$

Transformation ( $h, k \rightarrow$  Translation Factors)

$$y = \frac{a}{x-h} + k$$

$$x=h$$

← Vertical Asymptotes

$$y=k$$

← Horizontal Asymptotes

Dilation Factor

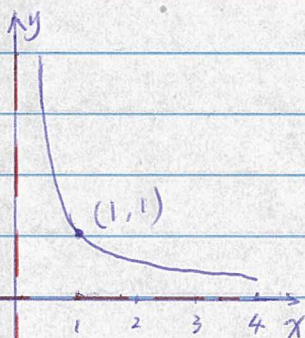
$$a=1$$

$a > 1$  outwards

$0 < a < 1$  inwards

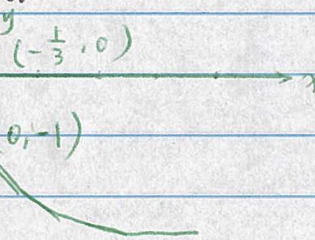
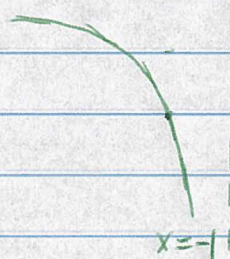
$a < 0$  flip/reflect

$$y = \frac{1}{x}$$



$$(-1, -1)$$

$$y = \frac{2}{x+1} - 3$$



$$y = -3$$

$h = -1$   $x = -1$  } Asymptotes  
 $k = -3$   $y = -3$  }

$$a = 2$$

## 4B The Truncus

Parent Graph

$$y = \frac{1}{x^2}$$

Transformation

$$y = \frac{a}{(x-h)^2} + k$$

Asymptotes

$$x=0, y=0$$

$$x=h, y=k$$

Dilation

$$a=1$$

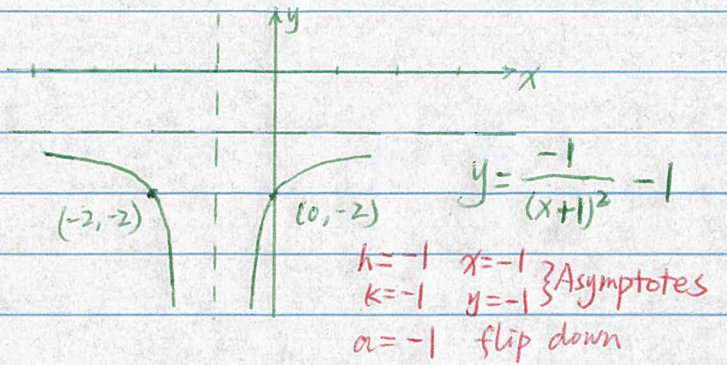
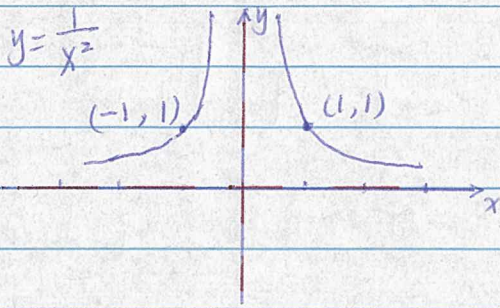
$a > 1$  outwards,  $a < 0$  flip,  $0 < a < 1$  inwards

Intercepts

$$y\text{-int } x=0$$

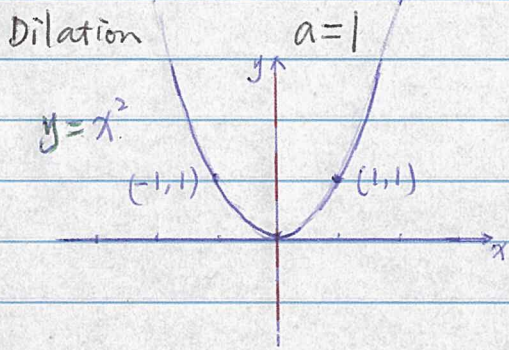
$$x\text{-int } y=0$$



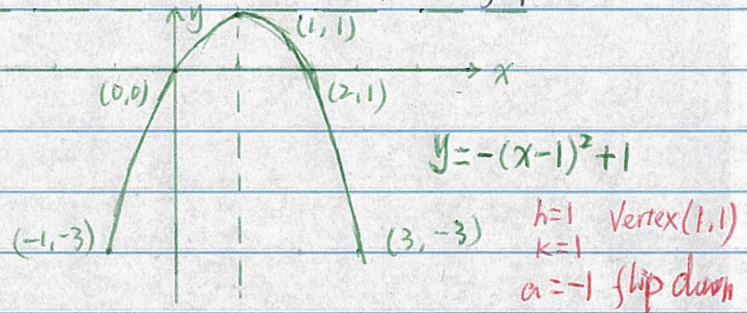


### 4C Parabola

Parent Graph	$y = x^2$	Transformation	$y = a(x-h)^2 + k$
Symmetry line	$x = 0$		$x = h$
Vertex Point	$(0, 0)$		$(h, k)$

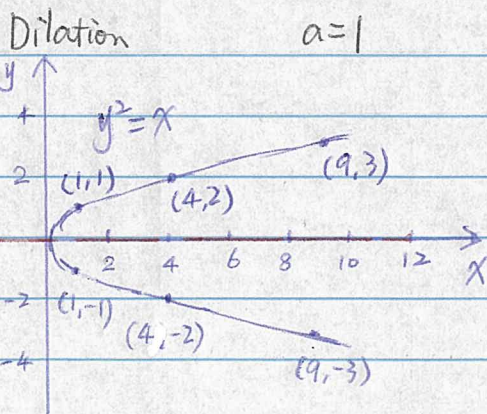


$a > 1$  inwards,  $0 < a < 1$  outwards,  $a < 0$  flip down

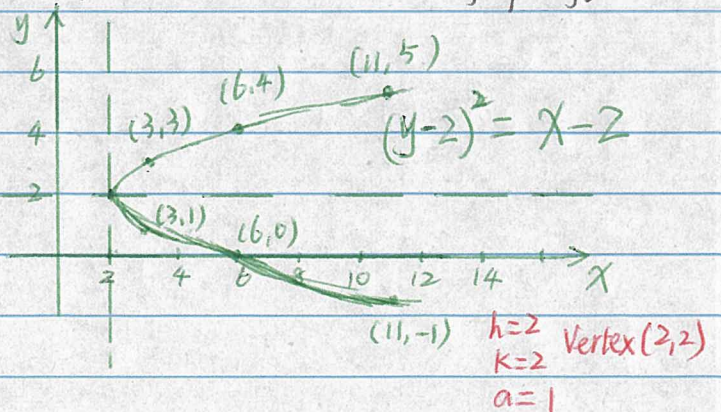


### Sideway Parabola

Parent Graph	$y^2 = x$	Transformation	$(y-k)^2 = a^2(x-h)$
Symmetry Line	$y = 0$		$y = k$
Vertex Point	$(0, 0)$		$(h, k)$



$a > 1$  outwards,  $0 < a < 1$  inwards,  $a < 0$  flip left

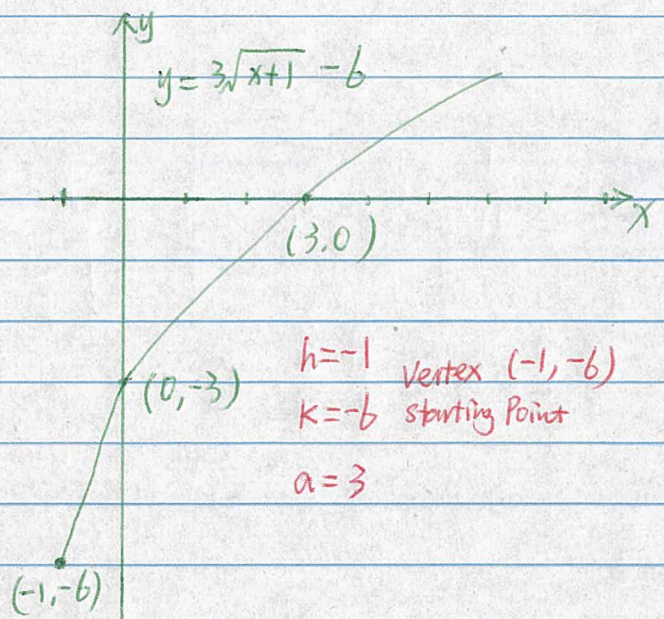
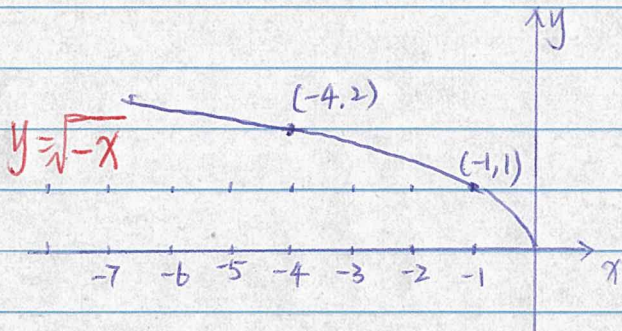
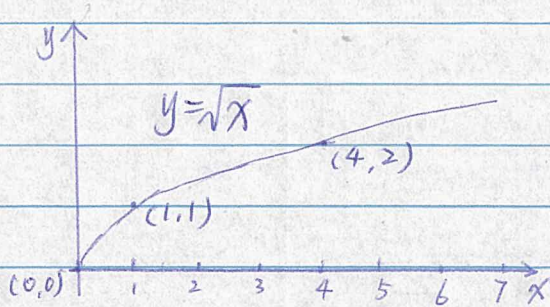


### 4D The graph of $y = \sqrt{x}$ (half Sideway Parabola)

Parent Graph	$y = \sqrt{x}$	Transformation	$y = a\sqrt{x-h} + k$
Starting Point	$(0, 0)$		$(h, k)$

Dilation  $a = 1$   $a > 1$  outwards  $0 < a < 1$  inwards,  $a < 0$  flip down





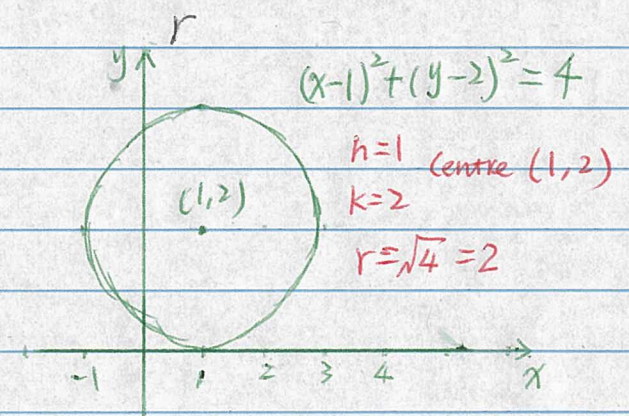
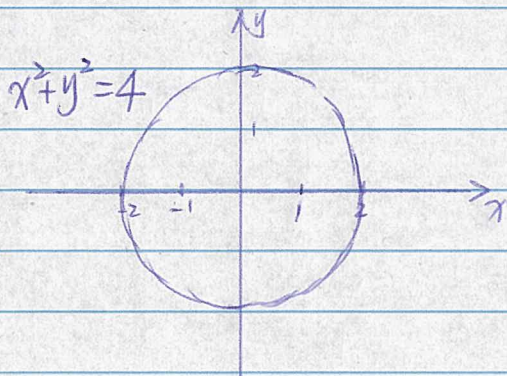
### 4E Circles

Parent Graph  $x^2 + y^2 = r^2$  Transformation  $(x-h)^2 + (y-k)^2 = r^2$

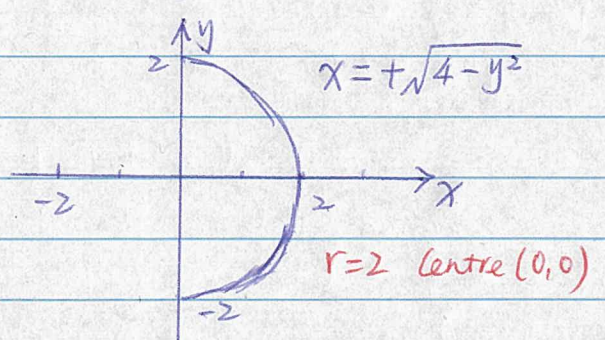
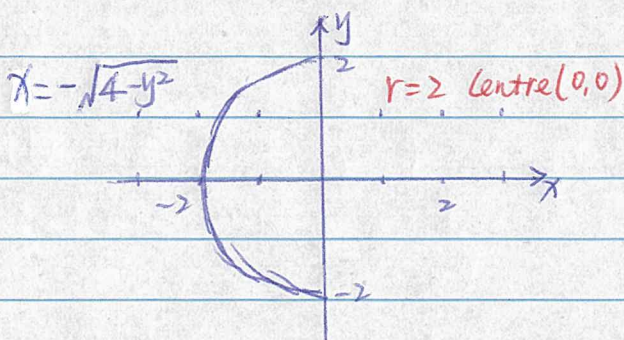
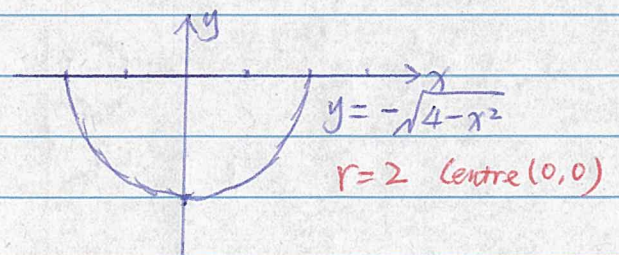
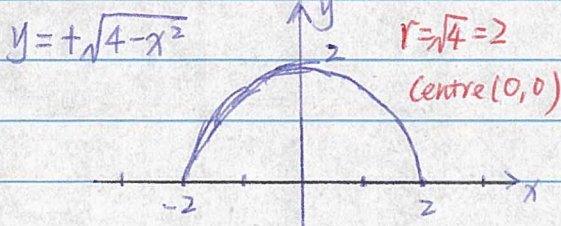
Centre Point  $(0,0)$

$(h,k)$

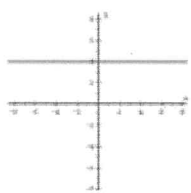
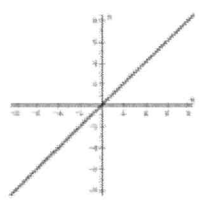
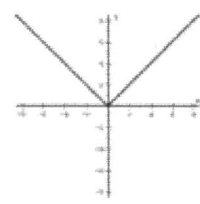
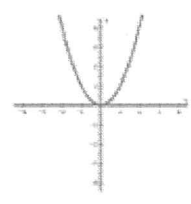
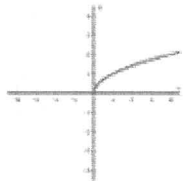
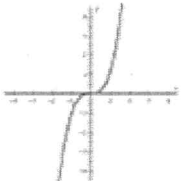
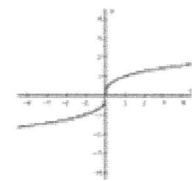
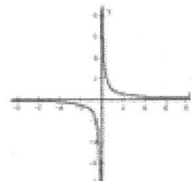
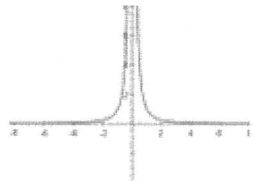
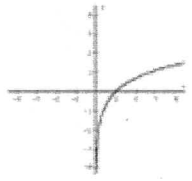
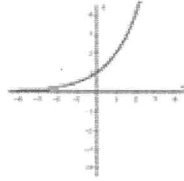
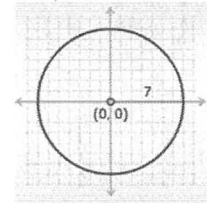
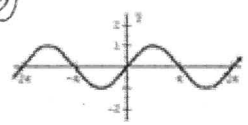
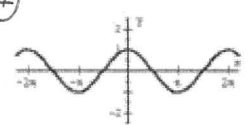
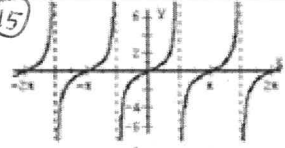
Radius  $r$



### Semicircles





<p>① Constant</p>  <p><math>y = c</math></p>	<p>② Linear</p>  <p><math>y = x</math></p>	<p>③ Absolute Value</p>  <p><math>y =  x </math></p>	<p>④ Parabola</p>  <p><math>y = x^2</math></p>
<p>⑤ Square Root</p>  <p><math>y = \sqrt{x}</math></p>	<p>⑥ Cubic</p>  <p><math>y = x^3</math></p>	<p>⑦ Cube Root</p>  <p><math>y = \sqrt[3]{x}</math></p>	<p>⑧ Hyperbola</p>  <p><math>y = \frac{1}{x}</math></p>
<p>⑨ Truncus</p>  <p><math>y = \frac{1}{x^2}</math></p>	<p>⑩ Logarithmic</p>  <p><math>y = \log x</math></p>	<p>⑪ Exponential</p>  <p><math>y = 2^x</math></p>	<p>⑫ Circle</p>  <p><math>x^2 + y^2 = r^2</math> <math>x^2 + y^2 = 49</math></p>
<p>Trigonometric Functions →</p>	<p>⑬</p>  <p><math>y = \sin(x)</math></p>	<p>⑭</p>  <p><math>y = \cos(x)</math></p>	<p>⑮</p>  <p><math>y = \tan(x)</math></p>

Graph 8 & 9: Asymptotes  $x=h, y=k$ , Dilation  $a > 1$  outwards  $0 < a < 1$  inwards  
 $a < 0$  flip down

Graph 4 & 5: Vertex/Starting Point  $(h, k)$  Dilation  $a$ .  
Symmetry Line  $x=h$  for Graph 4.

Graph 12: Centre  $(h, k)$  Radius  $r$